Designing an Instructional Model to improve Reading Abilities of Technical Documents and Learning Attitudes for Vocational Students in China

Fei Luo
Mahasarakham University, Thailand
Email: 64010562007@msu.ac.th

Jiraporn Chano
Mahasarakham University, Thailand
Corresponding author’s email: jiraporn.j@msu.ac.th

Hengliang Chen
Shenzhen City Polytechnic, China
Email: 38788863@qq.com

Received: 1 September 2022
Reviewed: 3 November 2023-14 January 2024
Accepted: 29 May 2024
Published: 28 June 2024

Abstract
The purpose of this study is to develop an instructional model to improve the reading abilities of technical documents, and to enhance students’ positive learning attitudes for TVE college students in China. This study developed a teaching model based on the Information Processing Approach, Vygotsky's Scaffolding, and Motivation. This teaching mode has the characteristics and technical attributes of TVE, which can (a) improve the reading ability of TVE college students on technical documentation, and (b) enhance the students' positive learning attitude (enthusiasm). This teaching model includes (1) Principles of the model, (2) Objectives, (3) Syntax, (4) Social system, (5) Principles of reaction, and (6) Support system. Through the application of two classes at Shenzhen Institute Technology in China, it can be seen that three-information input and output activities can be formed in both applications, and there is a progressive relationship between the three activities, and the three activities can fully stimulate students' learning enthusiasm.

Keywords: Technical and vocational education (TVE) students; reading abilities; learning attitudes; instructional model

Introduction
Education in China is divided into general education and Technical and Vocational Education (TVE), which have the same educational status (The State Council of the People's Republic of China, 2019). It is divided into 3 stages in Fig.1, which conclude stage1(K1-K12 basic
education stage), stage2(K13-K15 senior school education stage or TVE school education stage), and stage3(university education stage after K16). When a student enters K13, according to the characteristics of the student, the student will have two-way choice which is to enter a TVE college or a senior school to study. Senior school students mainly study language, mathematics, physics, chemistry, biology, geography, history, political economy and other courses, focusing on cultivating cognitive skills, language skills, logical skills, and speculative skills, so as to lay a good foundation for future higher studies. The foundation of the profession, the career is oriented towards researchers, managers and engineers, etc. In addition to learning basic knowledge of language and mathematics, TVE students also need to learn professional (or technical) knowledge, focusing on cultivating students' professional and technical abilities, and their careers are geared to engineers and technical operators.

Fig.1 Education frame in China

Table.1 The Minimum Score for University or TVE College Admission in three provinces from 2017 to 2021 (Guangdong et al., 2017, 2018, 2019, 2020, 2021)

<table>
<thead>
<tr>
<th>Year</th>
<th>Guangdong Province</th>
<th>Henan Province</th>
<th>Liaoning Province</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Liberal arts</td>
<td>Science</td>
<td>Liberal arts</td>
</tr>
<tr>
<td></td>
<td>UA</td>
<td>VC</td>
<td>GBVU</td>
</tr>
<tr>
<td>2017</td>
<td>418</td>
<td>210</td>
<td>49.8</td>
</tr>
<tr>
<td>2018</td>
<td>443</td>
<td>215</td>
<td>51.5</td>
</tr>
<tr>
<td>2019</td>
<td>455</td>
<td>170</td>
<td>62.6</td>
</tr>
<tr>
<td>2020</td>
<td>430</td>
<td>160</td>
<td>62.8</td>
</tr>
<tr>
<td>2021</td>
<td>448</td>
<td>160</td>
<td>64.3</td>
</tr>
</tbody>
</table>

Note. UA = Minimum Score for Undergraduate Admission; VCA = Minimum Score for TVE College Admission; GBVU = Gap between TVE College and Undergraduate

From the Table.1, the UA (Minimum Score for Undergraduate Admission) in three provinces from 2017 to 2021 are increasing, while VCA (Minimum Score for TVE College Admission) are reducing. And the GBVU (Gap between TVE College and Undergraduate) are widening, which shows that the basic ability of students in TVE colleges is gradually lower than that of undergraduate schools. The entrance scores of students in TVE college are significantly lower than the scores of students in general institutions, while language and English are important components of the entrance scores, which shows that they have disadvantage in language and English compared to general students.
Reading is an essential skill for college students to accumulate knowledge and grow physically and mentally (Liu S.X., 2021). An effective writing and research process will lead to a quality product and composition skills are transferable to work life (S.Waldman & M.Igarashi, 2016). In their future careers, they need to combine theory and practice, which promote them to deal with the challenges of future work easily.

For example, in studying the mathematics, TVE college Students with high level of success are more inquisitive than students with low levels in the mathematics learning (Yorganci S., 2018). In TVE students’ primary and junior schools they have disadvantages in logical thinking, abstract thinking and memory ability, and they are easy to forget, couldn't clearly express knowledge, whose logical thinking is chaotic and learning efficiency is low. They are often hit and lose confidence in learning. So improving the motivation with self-confidence is very important for them. On the other hand, students' preferences for mastery and performance goals positively affect their preferences for depth of use and surface information processing strategies (Koopman M. et al., 2011). According to the U.S. Department of Education (2013), only 52% of all career and technological students persist to earn a certificate or to graduation. Compared with undergraduate students, TVE students have no advantages in cognitive, logical, and speculative abilities. TVE students have some difficulties, such as lack of interest in reading, improper methods and difficulties to develop habits (Xiong X.H., 2020). The library utilization rate of TVE students is decreasing year by year, whose enthusiasm for reading and learning is not high (Liu Y.P., 2014). They have weak reading foundation and don't read often (Qiu H., 2006). Some undergraduate students also have reading ability problems, because they don't cultivate good reading habits and master scientific reading methods, lack independent reading ability and in-depth reading ability (Guo Q., 2009). So how to improve the effectiveness of reading technical documents are very important to the college students, especially to the VTE students.

Reading is the basis of Cognitive ability, and how to efficiently improve the reading ability of technical documents with positive learning attitudes for TVE college students has become important research. In this research, it is very necessary to develop a new Instructional Model to improve reading ability of technical documents with positive learning attitudes as following: (a) to improve the reading abilities of technical documents for TVE college students, (b) to enhance students’ positive learning attitudes (enthusiasm).

Research questions are: (i) What are the basic information and needs for the development of the Instructional Model? (ii) What are the characteristics of the Instructional Model? (iii) What are the affection of implementation of the Instructional Model?

Purposes of the research of this paper are: (i) to study the basic information and needs for the development of an instructional model, (ii) to develop an instructional model, (iii) to study the affection of implementation of the instructional model.

Hypothesis of the model

<table>
<thead>
<tr>
<th>Purpose</th>
<th>H0</th>
<th>H1</th>
</tr>
</thead>
<tbody>
<tr>
<td>To improve the reading abilities of technical documents for TVE college students.</td>
<td>TVE college students wouldn't have reading abilities of technical documents reading higher than before by using a new Instructional Model.</td>
<td>TVE college students would have reading abilities of technical documents reading higher than before by using a new Instructional Model.</td>
</tr>
</tbody>
</table>
To enhance TVE college learners' positive learning attitudes (enthusiasm).

The hypotheses are shown as following table 2. There are two hypotheses of the model, which are used to:

- improve the reading abilities of technical documents for TVE college students.
  
  \[ H_0: \text{TVE college students wouldn't have reading abilities of technical documents reading higher than before by using a new Instructional Model.} \]
  
  \[ H_1: \text{TVE college students would have reading abilities of technical documents reading higher than before by using a new Instructional Model.} \]

- enhance students’ positive learning attitudes.
  
  \[ H_0: \text{TVE college students' attitudes wouldn't be more positive than the control by using the new Instructional Model.} \]
  
  \[ H_1: \text{TVE college students' attitudes would be more positive than the control by using the new Instructional Model.} \]

Literature review

Information processing approach

Information processing approach is a cognitive approach, cores of this approach are cognitive processes such as attention, memory, and thinking (John W. Santrock, 2016). And the factors influence the reading behavior of college students, which include reading motivation, the influence of parents and teachers, early reading experience and social environment (Yuan S.F. & Qian J., 2018). Robert Siegler (1998, 2016a, b) shows that there are three mechanisms work together to create changes in student’s cognitive skills: encoding, atomicity, and strategy construction. Attention is a key aspect of the encoding process (Schneider, 2015). According to the Atkinson and Shiffrin model (1968), memory involves a sequence of sensory memory, short-term memory, and long-term memory stages. Working memory (Baddeley, 2000, 2007, 2012, 2013) interacts with long-term memory, drawing information from long-term memory and transmitting information to long-term memory for longer storage. Forgetting happens by a lack of effective retrieval cues (Schneider, 2015; van Lamsweerde et al., 2016).

Vygotsky’s theory

the More Knowledgeable Other (MKO), the Zone of Proximal Development (ZPD) & Scaffolding were made by Vygotsky (1934; 1986). The More Knowledgeable Other (MKO) is person who has a higher level of knowledge, skills or experience. MKO is usually considered as a teacher, coach or elderly person, but MKO can also be a peer, a young person. The Zone of Proximal Development (ZPD) is the distance between students' ability to perform tasks under adult guidance and/or peer collaboration and students' ability to solve problems independently where learning takes place. Vygotsky’s Scaffolding is a method of teaching implementation. Students can help students understand the learning content by cooperating with MKO (such as teachers, model students, teaching support, etc.). Teachers choose teaching tasks that meet the curriculum objectives and students' needs, set teaching objectives according to students' ZPD, and use MKO (such as various teaching supports) to help student complete tasks. With the continuous teaching, students are encouraged to reduce their dependence on scaffolding and achieve independent
learning. In the process of implementation, when students cooperate with these MKOs, they will have a better learning effect than those who focus on learning content alone.

Developing approach of instructional model

A model of teaching is a way of building a nurturant and stimulating ecosystem within which the students learn by interacting with its components (Bruce R. Joyce et al., 2015). There are 6 components in a instructional model, (1) Principles of the model, (2) Objectives, (3) Syntax, (4) Social system, (5) Principle of reaction and (6) Support system.

Therefore, there are two key points in how to improve the TVE students' ability of reading technical knowledge and attitudes of learning, which are very important for the studying and future career. The first is the need for a new instructional model which content six components (Bruce R. Joyce et al., 2015) between teachers and students, which concludes the text, the detection of the text by sense organs, and interpretation and comprehension of the read text. And the model should fit the characters of student's psychology, such as stage 5 of the Erikson’s stages of psychosocial development (“Identity versus role confusion” is the typical character for person in adolescence (12 to 18 years)) (Erikson, 1968), Self-regulation, the More Knowledgeable Other (MKO), the Zone of Proximal Development (ZPD), and Scaffolding (Vygotsky, 1934; 1986). Secondly, the model could improve students' learning enthusiasm, which helps students improve their interest in learning, enhance their self-confidences and reduce their anxieties.

Instructional model

The model is derived from the Latin ‘mod-ulelus’, which is the sample, scale and standard (China Primary School Encyclopedia General Committee Sports Volume Committee, 1993). The model is also expressed as an object, plan or a set of rules to show what other things look like or how they work (Patte, D., 2023). For example, there are schemata and formulas for expression in theoretical expression, and there are models or models for comparison in social science (Che W.B., 2001). Instructional model refers to a relatively stable structural framework and activity procedure established under the guidance of certain theories (An F.H., 2021). Instructional model is a description of the relationship between the structure of teaching elements (Guo R. & Jia Y.T., 2022), and is the core basis for determining the arrangement of teaching process (Zhong C.S. et al., 2014). Curriculum of instructional model refers to the specific teaching activity structure that reflects the logical outline of specific teaching theories and is specifically determined to maintain the relative stability of a certain teaching task (Gu M.Y., 1999). A model of teaching is a way of building a nurturant and stimulating ecosystem within which the students learn by interacting with its components (Bruce R. Joyce et al., 2015).

Teaching activities are bilateral activities between teachers' teaching and students' learning. An instructional model includes six components: (1) Principles of the model, (2) Objectives, (3) Syntax, (4) Social system, (5) Principle of reaction and (6) Support system (Bruce R. Joyce, Marsha Weil, and Emily Calhoun, 2015). Li X.J. & Zhang W. (2019) believed that the instructional models of undergraduate engineering education include objectives, content, methods, evaluation and support through the research on the experience teaching of undergraduate engineering education at University College London. As an important factor in the causal link between teachers' teaching and students' learning, teaching models include the goals, contents and methods of media and teaching, the abilities of teachers and students, and the social and cultural environment (Zhao Z.Q. & Huang F.H., 2020) In the context of the construction of a skill-based society, based on the
perspective of guidance, internalization of standards, platform support, multi-party linkage and assessment drive, the education model of vocational education includes objectives, standards, environment, process and evaluation (Zhao J. & Yang X.Q., 2022).

In TVE, there are many instructional models, including CBE, project teaching, scaffolding teaching, PBL (problem-based learning), learning guided teaching, SCS (Story, Copy, State, Copy extended, Stimulate, Cooperate, Share) and so on. Li M. (2002) believes that CBE consists of four basic elements, such as teachers, students, knowledge and knowledge carrier. Project-based teaching includes five basic components as teaching content, teaching activities, process situation, teaching results and results evaluation (Wang W.H. & Xia H.X., 2003). Scaffolding teaching generally includes five links: scaffolding, entering the situation, independent exploring, collaborative learning and effect evaluating (Li T.T., 2022). PBL (Xie L. & Han L.Y., 2012) teaching model of Aalborg University in Germany includes three stages: (1) based on reality and asking questions, (2) based on cooperation and solving problems, and (3) based on synthesis and evaluating problems. Learning guided teaching should be based on the ability of medical posts in higher TVE, and should consider the six requirements of development environment, problem oriented, scenario simulation, teacher guidance, teacher-student interaction, and evaluation feedback, which are divided into four stages: teacher preparation, student preparation, classroom teaching, and evaluation feedback (Wang F.H. et al., 2006). Fu Q. (2021) who aims at the current popular maker education, creates the SCS maker teaching, and divides it into situation introduction, simple exploration, knowledge explanation, extended exploration, innovation stimulation, cooperative completion and creative sharing.

Instructional models connect educators to a well-developed and researched teaching method library, which represent the basis of professional teaching and "using research to guide practice"(Bruce R. Joyce et al., 2015). Reasonable teaching can make the same teaching content and materials play the best teaching effect (Fourier, 2018). Project based teaching is a goal-oriented activity. Learners use the target knowledge they learn to achieve results, achieve objectives through meaning exchange (Xiong Y., 2021), promote students to actively learn independently, cooperate in learning, and actively construct knowledge (Li Y.H., 2016). By adopting scaffolding teaching, teachers can achieve: (a) helping students completing independently similar tasks in the future by building scaffolding (Jadallah et al., 2011), (b) providing help and support for students to cross the distance between the current level and the goal (Rosenshine B. & Edmonds J., 1990), and (c) supporting students to engage in a task that could not have been completed (Pol et al., 2010).

For PBL (Problem-Based Learning), (a) its curriculum is developed, negotiated and co-built, which can be connected with the external platform and create a certain space for students to think independently (Junyent et al., 2013); (b) it has advantages over traditional teaching in stimulating students' innovation ability, cultivating students' comprehensive application ability, enhancing students' collaborative ability, strengthening students' ability to analyze problems, improving students' ability to deal with problems, satisfying students' sense of accomplishment and other aspects (Zhang Y.L. et al., 2013). The learning guided teaching is superior to the traditional basketball teaching in promoting the development of students' physiological, psychological and social health, as well as mastering special knowledge, technology and skills (Wei J.H. et al., 2005). Under the SCS, teachers no longer spend most of their classroom time on imparting knowledge, but focus on the cultivation of students' ability, optimize the teaching process, mobilize students' enthusiasm for learning, establish students' spirit of cooperation, improve students' innovation ability, and achieve good teaching results (Wang X., 2021).
There are some models such as Lecture—Showing/Telling, Worked Examples, Interactive Lecture, Flipped Classroom, Socratic Questioning, Discussion-Based Learning, Case-Based Learning, Collaborative Learning, Inquiry-Based Learning, Problem-Based Learning, Project-Based Learning and so on (Faculty Center of UCF, 2022). Efecan Karagöli (2020) uses text commentary model in reading, which could improve the reading skills in the Turkish language education. Rincon-Flores E.G. et al. (2022) find that gamification had proved to be a beneficial teaching model, which could promote the participation of undergraduates and enhance their motivation. Okasha M. A. (2020) uses "clarifying, prediction, questioning, and summarizing" to improve students’ reading skills in EFL study. Zubaidah S. et al. (2020) have used “Reading-Concept Mapping-Reciprocal Teaching” to improve low-ability students' achievement in biology. Some new technologies such as ICT, MR, VR, are used in teaching, and teachers thought that the massive open online courses (MOOCs) would be useful in class, which could help them allocate more resources to improve and expand their courses (İrem Erdem Aydın, 2021). Fu Q. (2021) applies the SCS teaching model to science education, emphasizing "technology, practice and sharing". Wang H.W. (2013) applies action-oriented project-based teaching to NC machining technology courses, (a) dividing task links according to project tasks, (b) defining teaching resources for each link, (c) defining teaching content, class hour arrangement and learning subjects for each task link, (d) designing teaching environment, and (e) conducting teaching evaluation.

Therefore, in TVE, instructional models refer to the establishment of a training and stimulating structural framework and activity procedure under the guidance of certain theories. Teachers and students form an interactive relationship through the models to carry out teaching and learning with certain relative stability. Instructional models include: (1) Principles of the model, (2) Objectives, (3) Syntax, (4) Social system, (5) Principle of reaction and (6) Support system. Teaching, learning, and teaching support system need to be worked by the syntax, meet the requirements of students and teachers, which could promote the realization of teaching objectives, improve students’ enthusiasm of learning, and promote the development of students' cooperation abilities, innovation abilities and comprehensive abilities.

Reading abilities of technical documents

As one of the basic skills in the 21st century, literacy is not only about learning to read, but also about learning to read and developing the ability and motivation to identify, understand, explain, create and exchange knowledge (Andreas Schleicher, 2022). "Reading ability" is one of the "basic learning skills" (Zhong Q.Q., 2000). In general, reading ability is often regarded as the text processing ability on the empirical level of individual reading activities, and belongs to the cognitive category of "functional psychology", including observation, memory, understanding, etc. (Liu H.X., 2021). With the rapid development of ICT, the scope of reading ability has been greatly expanded. Modern reading abilities also include information retrieval ability, network reading ability, and the ability to use digital information technology (Zhu J.L., 2021). In the work process of engineers or technicians, there are many types of documents, such as Initial report, Design report, Interim report, Recommendation report, Forensic engineering report, Numbers, figures, tables, equations, and graphical illustrations, Laboratory report, Letter of transmittal, Informal notes and engineering logbooks, Memorandum, Instructions and Email (Khan A. W., 2019). Technical documents are different from general daily application documents, which have specific objectives and objects (Khan A. W., 2019). The training of TVE college students is market-oriented and oriented to the posts of technical workers. Its curriculum development is often based on job task analysis and professional ability analysis (Xie L.H. & Peng C., 2022). In addition
to the training of reading ability of technical documents in work, it is also an important ability that needs to be cultivated.

Reading is a constructive thinking process, which includes not only the understanding of precise meaning, but also the understanding of implicit meaning (Peter D. Pumfrey, 1978). Reading abilities include understanding, application, analysis, evaluation and imagination. William Grabe (1991) believes that reading abilities include: automatic recognition skills, vocabulary and language structure knowledge, text structure knowledge, sociocultural background knowledge, comprehensive analysis and evaluation skills, metacognitive knowledge and monitoring ability. The object-oriented technical reading is clients, executive or government officials and colleagues (Khan A. W., 2019). The students’ Reading abilities include the ability to extract information, form explanations, overall perception and make evaluations, of which the ability to extract information is the basis (Sun S.Y. & Wan Y., 2016).

There are many factors that influence reading abilities of technical documents which had been studied by many researchers. Reading basically consists of three parts, such as the text, the detection of the text by sense organs, and interpretation and comprehension of the read text. When these three parts are implemented completely, a real reading is performed (Temizkan, 2007, Temizyurek, 2008). Reading barrier is always difficult to the college students, Andrianatos K. (2019) finds that they are some reading barriers within “namely students’ non-compliance and lack of abilities, elements of the textbook and availability of lecturer notes, the format of the task, throughput pressures, and lecturers’ assumptions”, and the teacher has a core role in reading support. Ingie Hovland (2019) has used the pre-class reading logs and in-class exercises in the class, which effectively fixes the issues of the students doing the reading. Marian L.O. and Gladys M. E. G.-G. (2020) find that cooperative learning projects have improved the engineering students’ reading skill by fostering group work and social skills.

For engineers, technical writing documents is very important for their career development (Abed & Ibrahim, 2017). For employees in the design industry, improving their reading abilities would help them accumulate professional design vocabulary, develop a sense of professional language, and lay a solid foundation for text translation, improving listening, speaking, communication and business e-mail writing abilities (Chen Q., 2015). Reading the professional documents is very important for the TVE students, which is one of the functional academic literacy abilities (Butler,2013; Pretorius, 2005). Effective writing and research processes can not only produce high-quality products, but also transfer this writing skill to work and life (S.Waldman & M.Igarashi, 2016). Reading could help college students to obtain, sort out and screen information, improve their abilities to judge, evaluate and use information, and become professional technicians (Lu B.D., 2018).

Reading is not limited to classes, magazines, novels, etc. In recent years, with the transformation of reading forms, carriers, and social ways, new reading models have emerged. Extensive reading should be combined with online comments, role playing and other activities to maximize its impact (Mushoffan P. & Rizkiana M., 2022). The training model of visual reading plus listening reading helps cultivate students’ fast reading ability (He C.Y., 2012). Dong Y.G. (2009) showed a teaching model to improve students’ initiative in independent learning and scientific research practice ability by reading academic papers published in academic journals when teaching the engineering students. Deng H. & Che Y. (2010) thought that the influence of cooperative language learning environment and traditional reading environment on learners' metacognitive ability is different. From the metacognitive, Mansoor A. C. et al. (2015) give two
angles with learning and process which includes the appreciation of the motion of the brain, official processes which contains the act of arranging, observing, and directing in the manner of thinking.

Reading comprehension can be measured by students answering some items at the end of the reading paragraph, such as measuring working memory, attention, language and reading ability. Compared with the answers at the end of the paragraph, this model has a significant impact on the measurement of students' performance. It can achieve more accurate reading comprehension evaluation by eliminating students' understanding barriers (Guerreiro et al., 2022). Yang Z.M. et al. (2018) took the reading ability evaluation as an example. Under the framework of item response theory (IRT), they implemented value-added evaluation from five dimensions of reading comprehension, logical reasoning, fact judgment, hypothesis identification and argumentation evaluation through equivalent processing. This model can not only help to discover the development law of teenagers' reading abilities, and then improve the teaching of reading, but also overcome a series of problems brought about by the summative evaluation, such as "one exam determines life", "hurting the learning enthusiasm of students with weak foundation", etc. Rahmawati et al. (2021) evaluated students' reading ability by developing a reading test instrument for BIPA (Bahasa Indonesia Untuk Penutur Asing). Through the experiment of 21 international students, it is found that the test instrument has distinct level. The Gunning Fog Score and Automated Readability Index are the most relevant text readability formulas for evaluating the difficulty level of BIPA test instruments.

Therefore, reading abilities of technical documents are required skills for TVE students to learn professional (or technical) documents and work in the future. They must read these documents. Reading abilities of technical documents include the understanding ability, analysis ability, evaluation ability, application ability and imagination ability of technical documents. As can be seen from their enrollment results, vocational college students are not good at reading. However, in their work, they have to face technical books, standards and technical specifications. Therefore, students in vocational colleges need to solve these basic problems and improve their reading abilities from reading forms, reading materials, teaching models, educational technologies and learning attitudes.

Learning attitudes

Attitude towards individual, object, a situation or a case, which has three parts such as being cognitive, affective and behavioral (Oskamp et al., 2005). Learning attitudes are relatively stable psychological tendency (Liu H.X. et al., 2014) formed in the process of self-learning, including cognitive, emotional and behavioral tendencies, which has a regulatory significance on learning behavior (Guan R. et al., 2018). Learning attitudes are very important for the TVE students. The Science Attitude Scale (Akinoğlu, 2001) has determined target audience attitudes towards science courses. When the students learn and solve the problems, they must have positive feeling and thought in their learning attitudes (Komşu et al., 2018).

Breklner (1984) proposed the ABC model of attitudes, which are composed of three elements: affective, behavioral, and cognitive. The traditional consideration of students' learning attitudes is generally from the classroom perspective. Students' learning attitudes include students' attendance, homework completion, class seriousness, whether they are active in asking and answering questions, etc. (Sun Q.G., 2012). Students learn too much as a relatively stable positive or negative psychological tendency shown by students on learning and learning situations (Zhang L.L. & Ma H.B., 2014). learning attitudes include three components: emotional experience, behavioral tendency and cognitive level (Tao D.Q., 2001). Students often learn in a group
environment, in which their learning attitudes include learning awareness, participation and self-confidence (Li Y. & Wen H.F., 2015).

Learning attitudes refer to the factors that arouse learners' interest in learning and encourage them to participate in the learning process (Liu X.B. et al., 2018). Learning attitudes are not innate, which would change with the interaction between the individual learner and the environment, depending on the degree of education and efforts received by the individual (Zhao J.H. et al., 2008). Learning attitudes affect the development of pragmatic awareness, and the stronger the learning motivation and the more active attitudes, the higher the development of learners' pragmatic awareness (Takahashi, 2005; Davis, 2007).

Learning attitudes refer to learners' cognition and emotion of learning and the psychological state that determines their own behavior tendency (Wen Y.Y. et al., 2015). Kian (2022) develops a questionnaire made by researchers through intervention research on medical educators, using the Kirkpatrick evaluation model, to assess the impact of the curriculum on response, knowledge and perceived behavior, and finds that the e-flipped learning approach could improve the knowledge, attitude and behavior of medical educators on online teaching. The main purpose of students is to learn knowledge and skills, but the learning attitudes are equally important. Díez-Palomar J. et al. (2020) used the SAM questionnaire as an evaluation tool to analyze the impact of the implementation of interactive groups (IG) and dialogic literary gatherings (DLG) on students' learning attitudes. Through data, it is proved that participation in international IGs and DLGs enables students to change their own learning attitudes, and there is a positive correlation between students' achievements and learning attitudes. Reading ability as a cognitive ability, Adamopoulos (2020) finds that curriculum design might affect people's attitudes towards cognitive enhancers by exploring the relationship between learning models and personal competitiveness and attitudes towards cognitive enhancers, which may change the use of these courses in turn.

Therefore, learning attitudes are psychological states, which include cognition, emotion and behavior. Learning attitudes are also changing, which would be affected by individuals, objects, situations, motivations, etc. Learning attitudes are not innate, but can be adjusted through the acquired activities. However, TVE college students generally lack learning enthusiasm, are not interested in learning, and do not like learning theoretical documents. It is urgent to change their learning attitudes and improve their learning initiative, which improves the learning performance and adapt to the technical projects in the future work.

Research method

Conceptual Framework: From the Fig.2, there are independent and dependent variables as follows. The independent variable is a new instructional model. There are two dependent variables in this research. The first is the reading abilities of technical documents, which aims to evaluation the new model and is evaluated by quantitative ways. The second is the learning attitudes of VTE students, which aims to compare the attitudes to the new model from the students and is studied by quantitative ways.
Table 3. Phases of the research

<table>
<thead>
<tr>
<th>Questions</th>
<th>Purpose</th>
<th>Phase</th>
</tr>
</thead>
<tbody>
<tr>
<td>What are the basic information and needs for the development of the Instructional Model?</td>
<td>To study the basic information and needs for the development of an instructional model</td>
<td>Phase I Contextual Study</td>
</tr>
<tr>
<td>What are the characteristics of the Instructional Model?</td>
<td>To develop an instructional model</td>
<td>Phase II Planning and construct Innovation</td>
</tr>
<tr>
<td>What are the affection of implementation of the Instructional Model?</td>
<td>To study the affection of implementation of the instructional model</td>
<td>Phase III Implementation</td>
</tr>
</tbody>
</table>

Design
In this paper, there are three phases in table 3.

**Phase I. Contextual study**

**Population**
There are three populations. (a) All vocational students and (b) teachers in Engineering Major in Shenzhen Institute of technology in Shenzhen, China. There are 1365 students from 36 classes of 5 majors and 70 teachers. (c) The documents are from Global literature website.

**Sample**
Full sample questionnaire survey teachers and Full Sample questionnaire surveys students are chosen in Engineering Major in Shenzhen Institute of technology in Shenzhen, China. The documents are from Eric, CNKI, EBSCO, UNESCO, OECD, ScienceDirect and so on.

**Instrument**

**Students survey**
From the perspective of students, there are some objectives in these surveys by questionnaires: to investigate what are students’ problems on (a) reading abilities and (b) learning attitudes from the view of students.

**Teacher survey**
From the perspective of teachers, there are some objectives in these surveys by questionnaires: to investigate what are students’ problems on (a) reading abilities and (b) learning attitudes from the view of teachers.

**Existing data research**
Existing data are from Chinese official statistics, UNESCO and OECD on TVE, there are some objectives in these surveys: to investigate what are students’ problems on (a) reading abilities and (b) learning attitudes from the view of teachers.

**Documentary research**

The documentary research is based on the research purpose, through searching, sorting out literature and conducting research, to form the research results of what are students’ problems on (a) reading abilities and (b) learning attitudes from the view of teachers.

**Construction and quality of instrument**

Questionnaire would be design with those steps: (a) objectives analysis, (b) literature review, (c) questionnaire design, (d) expert review, (e) questionnaire revise1, (f) preliminary investigate, (g) questionnaire revise2, (h) formal investigate. In the expert review, there are more than 5 or 7 experts would be chosen, who are mainly composed of curriculum development experts and TVE research experts.

**Phase II. Planning and construct innovation**

**Population**

All TVE students and teachers in Engineering Major in Shenzhen Institute of technology in Shenzhen, China. There are 1365 students from 36 classes of 5 majors and 70 teachers.

**Sample**

10 teachers and 25 students are chosen in Engineering Major in Shenzhen Institute of technology in Shenzhen, China.

**Instrument**

*Students’ interviews*

From the perspective of students, Semi-structured interviews would be used to investigate the needs in new instructional models.

*Teacher interviews*

From the perspective of students, Semi-structured interviews would be used to investigate the needs in new instructional models.

**Construction and quality of instrument**

In the specific process of data collection, (a) the triangular test would be used for improving the quality of instrument. (b) In the model design, there are more than 5 or 7 experts would be chosen to evaluate the model, who are mainly composed of curriculum development experts and TVE research experts. (c) New model concludes six parts: (1) Principles of the model, (2) Objectives, (3) Syntax, (4) Social system, (5) Principle of reaction and (6) Support system.

**Phase III. Implementation**

**Population**

All TVE students and teachers in Engineering Major in Shenzhen Institute of technology in Shenzhen, China. There are 1365 students from 36 classes of 5 majors and 70 teachers.
Instrument
Testing score
A test of technical reading by the model: (a) Quantitative by comparing the effect on reading abilities of technical documents between the traditional and new. (b) Quantitative by comparing the effect on reading abilities of technical documents between pre-test and post-test.

Students survey
Questionnaire scores on students’ learning attitudes: Quantitative by comparing post-attitudes between the traditional and new.

Construction and quality of instrument
Stratified Sampling with random selection, and pre-post evaluations

Results
Principles of the model
This model which we could use to improve reading abilities of technical documents and learning attitudes for vocational students includes 9 phases: Assign tasks, Pre-learning, Scenario introduction & Task introduction, Mutual Assessment, Affirm and comment, Implementation, Learners revision, Summary and Assignment the next Task, Final Assessment (see Fig.3).

Objectives
This Instructional Model has the characteristics and technical attributes of TVE, which can (a) improve the reading abilities of technical documents for TVE college students, and (b) enhance students’ positive learning attitudes (enthusiasm).

Syntax
Assign tasks
phase one calls for activities that require the learner to get the task that helps that leaners know what they would be learn in this task.

Pre-learning
in the phase two, learners study the materials and finish the work pages with black pen by themselves before class, which give learners by first level information processing, while they know what and some new thinking would appear by self-construction. In this phase, the information will be input into learners' memory for the first time through autonomous learning and be output into the working page from the memory.

Scenario introduction & Task introduction
Phase three is to simulate the scenario, and through scenario introduction, let students feel the task. In implementation, leaners would be encouraged to participate through Going into Simulation, Roleplaying as Engineer, Acting out the scenario and Discussing what you have learned.

Mutual assessment & affirm and comment
in phase four and five, learners do mutual assessment for the work pages each other’s in class, which gives learners by second level information processing, while they ask why and middle
level thinking. The information would be input into the learner's memory for the second time through communication learning and be output from the memory to the evaluation work page.

**Implementation & learners revision**
In phase six and seven, teachers will combine the feedback from students in the previous stage of learning and provide in-depth lectures on the course. Learners do revising for the work pages with the blue pen by themselves in class, which gives learners by third level information processing, while they explore new and high level thinking. The information will be input into the learner's memory for the third time by listening to the teacher's lecture, and output from the memory to the revising work pages.

**Summary and assignment the next task**
Phase eight is on summarizing the content learned and moving on to the next teaching task.

**Final assessment**
In the phase nine, The teacher gave a general evaluation of this task, and the task ended.

**Social system**
The social system is autonomous and interactive. Form a group team between students or a team between leaners and teachers, and shape new ways of memory access.

**Principle of reaction**
In this model, teachers’ role is to help leaners to work learning material. The teacher starts from setting up simulated scenarios, and leaners integrate role-playing into the scenarios to help learn materials. The teacher helps students form three inputs and outputs of memory, including the first self-directed learning, the second communicative learning, and the third assisted learning. These three memories have three levels, which is a continuous progressive relationship between them.

**Support system**
Pictures, videos, and case materials are particularly important for enhancing students' situational experience. The input and output of three memories have different support. The input and output of the first memory should provide more online learning materials, which could help leaners engage in targeted autonomous learning. The second needs to provide learning materials with evaluable reference standards for students, which helps them carry out mutual evaluation learning. The third time requires providing diverse teaching materials or discussing topic materials, which could help students improve their learning.

**Implementation**
An example task (Operation of safely entering and exiting the top of the elevator car) is shown in Fig.4, which is one of basic operating skills in the lecture, which is named as the Elevator Basic Maintenance. The teaching objectives of this task include (1) learning knowledge related to elevator car top operation and (2) mastering the operation skills of entering and exiting the top of the car.

Sample: 17 elevators G3-1, 17 people, 2 girls, 15 boys. 17 Elevator G3-2, 15 people, 2 girls, 13 boys.
Analysis for students: (1) They possess certain knowledge of spatial geometry and physics, and carry out installation of shaft components simultaneously. (2) They have certain theoretical analysis and information retrieval abilities, and have just entered the field of professional knowledge learning. Their group learning and communication skills need to be improved. (3) They have clear learning goals, low interest in learning, inactive thinking, and a certain level of control ability. Their thinking is not active, relatively dull, and their awareness of active learning is not strong.

Figure 3. The instructional model
Figure 4. The implementation of task: Operation of safely entering and exiting the top of the elevator

Figure 5. Leaners’ work pages

Figure 6. Leaners’ feedback
This model had been used in the lecture, which could help the VTE student’s (a) improve the reading abilities of technical documents for TVE college students (Fig.5), and (b) enhance students' positive learning attitudes (Fig.6).

Discussion and conclusion
Reading, as a basic ability, is a must-have for college students in traditional cognition. From the literature, with the development of informatization, digitization, and networking, the reading of college students has become increasingly fragmented and blurred. Although research has been conducted on the reading ability of college students from both objective and subjective factors, there is little research on the technical literature reading ability of vocational college students with special vocational attributes. One of the elements for improving effective reading ability in technical skills and knowledge is an effective teaching model.

This study developed a teaching model based on the Information Processing Approach, Vygotsky's Scaffolding, and Motivation. This teaching mode has the characteristics and technical attributes of TVE, which can (a) improve the reading ability of TVE college students on Technical documentation, and (b) enhance the students' positive learning attitude (enthusiasm). This teaching model includes (1) Principles of the model, (2) Objectives, (3) Syntax, (4) Social system, (5) Principles of reaction, and (6) Support system Among them, syntax consists of Assign tasks, Pre learning, Scenario introduction & Task introduction, Mutual Assessment & Affirm and comment, Implementation & Leaners revision, Summary and Assignment of the next task, and Final Assessment.

Through implementation in elevator routine maintenance courses, it can be seen that both theoretical learning and skill learning can form three activities of information input and output, and there is a progressive relationship between the three activities, and the three activities can fully stimulate students' learning enthusiasm.

However, this model can improve the reading ability of TVE students on technical documentation and enhance the learning enthusiasm of most students. However, in practical operation, there is still a process that is too cumbersome, requiring a large number of images, videos, and file materials. At the same time, it is necessary to use information technology for online learning. Teachers need to be trained in operational guidance, technology, and workload. In future research, research is needed to optimize the operational process and improve the applicability of the project.

Declaration of conflicting interest
The authors declare that there is no conflict of interest in this work.

Funding acknowledgements
The research received no external funding.

References
Guangdong enrollment Committee. (2020). Notice on Announcement of the Minimum Scores for
Admission to Ordinary Colleges and Universities in Guangdong Province in 2020. Web site: http://eea.gd.gov.cn/bmbk_stjwj/content/post_3051029.html


Liaoning Provincial enrollment and Examination Office. (2021). The score line for the admission control of cultural courses in Colleges and universities in Liaoning Province in 2021. Web site: https://www.lnzsks.com/newsinfo/IMS_20210623_40100_MaoGIOzUgD.htm

Liaoning Provincial enrollment and Examination Office. (2020). The score line for the admission control of cultural courses in Colleges and universities in Liaoning Province in 2020. Web site: https://www.lnzsks.com/newsinfo/IMS_20200723_38604_xGZgO0NAVt.htm


Siegler, R.S. (2016a). Continuity and change in the field of cognitive development and in the perspective of one cognitive developmentalist. *Child Development Perspectives, 10,* 128–133.

Siegler, R.S. (2016b). How does change occur? In R. Sternberg, S. Fiske, & D. Foss (Eds.), Scientists make a difference: One hundred eminent behavioral and brain scientists talk about their most important contributions. Cambridge, UK: Cambridge University Press.


House.
Xie, L. & Han, L.Y. (2012). Case teaching design and research of Investment based on constructivism - taking "market order" as an example. Finance and Accounting Communication, (36), 147-149. doi: 10.16144/j.cnki.issn1002-8072.2012.36.038
Xiong, Y. (2021). Research on chemical experiment teaching in senior high school based on project-based learning (master's thesis, Southwest University) 
Li, Y.H. (2016). A new exploration on the application of project teaching method in the teaching of art design -- taking the course of exhibition design in secondary vocational schools as an example. Vocational and Technical Education (29), 32-35.

404
Advances in Language and Literary Studies, 10(4), 80.


Chen, Q. (2015). Empirical research on industry English skills demand survey - taking the design industry as an example higher vocational education (Journal of Tianjin Vocational University) (06), 91-95.


Liu, H.X., Zhao, W., & Wang, L.J. (2014). Research on the impact of teacher expectations on college students' learning attitudes in a blended learning environment. Journal of Distance Education (01), 63-70. doi: 10.15881/j.cnki.cn33-1304/g4.2014.01.009